Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Technology

Ageing can play havoc with face-recognition systems

Matthew Sparkes

WE CAN age as little as five years before face-recognition algorithms begin to struggle to identify us as the same person. This means systems that rely on facial recognition may need to get new images of users more often.

Face recognition is now used at border crossings, by police to watch for known offenders in public and even to unlock our phones. But there has been little research on how such systems cope with faces changing over time. So, Marcel Grimmer at the Norwegian University of Science and Technology and his colleagues designed a test to assess this.

The team used open-source alternatives to face-recognition tools used by police forces and smartphone makers, which don't reveal how their own algorithms work, and also used AI-generated images of 50,000 people aged artificially to various degrees, due to the scarcity of real data sets collected over long time frames.

Grimmer says the accuracy of face-recognition systems dropped continuously over time from when the reference image was taken, rather than suddenly. Within five years, they usually identified people, but after that, they began to struggle. Gaps beyond 20 years proved difficult for the systems (arxiv.org/abs/2208.08207).

He says faces will age differently depending on lifestyle factors and stage of life, so knowing how often face-recognition systems need to update photos of users is hard.

"Babies will change within two months. Generally, even until the age of 20 years, the face still kind of changes," says Grimmer. Then, from about 20 to 60, the identity is more stable and there will only be some texture changes, like wrinkles. After that, the face shape begins to shift again, and you have more pronounced wrinkles, he says. ▮

Medicine

Mutation-inducing drugs could raise virus dangers

Michael Le Page

THE use of antiviral drugs that kill viruses by inducing lots of mutations should be restricted because of potential dangers highlighted by new research, some researchers say. Computer modelling suggests these drugs could result in viruses acquiring changes they wouldn't do otherwise and in a way that lab testing will miss.

All organisms continually mutate and most of these mutations are detrimental. Harmful mutations are normally eliminated from populations by natural selection, but if the rate of change is high enough, natural selection cannot get rid of mutations fast enough to prevent them building up to lethal levels and killing entire populations.

Mutagenic drugs are designed to raise mutation levels in viruses or cancer cells and produce such a "mutational meltdown". Several mutagenic drugs are in use, including molnupiravir, which is used to treat covid-19. The drugs consist of molecules that mimic the building blocks of RNA and get added to the RNA genomes of viruses when they replicate, inducing mutations.

> "Such complex mutations could have effects that are advantageous to the virus"

Using a model, Claudia Bank at the University of Bern in Switzerland and her colleagues assessed several potential ways for viruses to evolve resistance to these drugs. The most surprising finding is that changes that make viruses more susceptible to the effects of harmful mutations could, in very rare cases, help them escape meltdown.

This can happen because a higher susceptibility to harmful mutations also makes natural selection more effective at removing harmful mutations. But this susceptibility must evolve very early on or a virus population will already have accumulated enough harmful mutations to drive it extinct.

The model suggests this would be so rare that the escape mechanism would be unlikely to be seen in lab testing and human trials before a drug is approved, but it could occur if a drug is given to millions of people (bioRxiv, doi.org/h9cr).

If this happened while a person was being treated, the risk wouldn't just affect them. A virus that survives treatment with a mutagenic drug could acquire a lot more mutations than it would otherwise, potentially leading to the evolution of more dangerous variants that could spread widely if they went on to infect other people.

"Such complex mutations could outrun the human immune system or have other effects that are advantageous to the virus," says Bank.

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Medicines in a drugstore in Miami, Florida

The risks will be even higher if people miss doses or fail to complete drug courses, she says. "I would suggest that mutagenic drugs should only be administered in hospitals and doctors' practices such that doses and administration intervals are monitored," she says. "As regularly happens with antibiotic treatments, patients are likely to forget to take the drug or to stop treatment prematurely when they feel better, if they are allowed to administer it by themselves."

William Haseltine at global health think tank ACCESS Health International says the study's conclusions seem accurate, but confirming them will require experimental observations.

A spokesperson for Merck, which makes molnupiravir, says: "History has shown that insights made solely from computational modelling experiments require careful evaluation and interpretation when compared to findings from studies conducted in living systems." ▮